

CLAIMS

1. A process for carrying out a chemical reaction involving a first organic compound which has been vaporised from the liquid phase under conditions which render the liquid phase form of the pure compound prone to degrade, characterised in that vaporisation of said first compound from the liquid phase is effected using a second compound in such a way as to suppress degradation of said first compound.
2. A process as claimed in Claim 1 in which the chemical reaction comprises reaction of said first compound with another compound.
3. A process as claimed in Claim 2 in which the other compound comprises said second compound.
4. A process as claimed in Claim 3 in which said second compound is used in its liquid phase.
5. A process as claimed in Claim 1 in which the chemical reaction comprises isomerisation of the first compound.
6. A process as claimed in any one of Claims 1 to 5 in which vaporisation of the first compound is effected by co-vaporisation thereof with the second compound.
7. A process for carrying out a chemical reaction at elevated pressure, comprising vaporising under elevated pressure conditions a liquid phase organic compound which is prone to degrade when vaporised under such conditions, and reacting the vaporised compound with at least one other reactant in the gaseous phase under conditions which permit the reaction to proceed, characterised by modifying the boiling characteristics of the organic compound such that vaporisation can be effected at reduced temperature thereby preventing or substantially reducing the production of degradation products.
8. A process as claimed in any one of the preceding claims in which the organic compound comprises a halocarbon.
9. A process as claimed in Claim 8 in which the halocarbon comprises a chloroethene or chloroethane.
10. A process as claimed in Claim 7 in which the boiling characteristics of the organic compound are modified by co-vaporising the compound in admixture with another compound forming one of the reactants.

11. A process as claimed in Claim 7 in which said organic compound is one which provides a mixture capable of forming a minimum boiling azeotrope with the other reactant.

5 12. A process for carrying out a chemical reaction involving a halocarbon in its vapour phase, in which prior to the reaction the halocarbon is vaporised under elevated pressure conditions at which the boiling point of the compound per se is such that vaporisation of the compound per se is accompanied by degradation of the compound if
10 vaporised at that boiling point, characterised in that the halocarbon is co-vaporised in admixture with hydrogen fluoride whereby the boiling temperature of the halocarbon compound/HF mixture is such that vaporisation is accompanied by substantially less degradation of the halocarbon compound.

15 13. A process for effecting fluorination of a chlorocarbon compound at elevated pressure, comprising vaporising the compound under elevated pressure conditions at which the boiling point of the compound per se is such that vaporisation of the compound per se is accompanied by degradation of the compound if vaporised at that
20 boiling point, and reacting the vaporised compound with a fluorinating agent in the gaseous phase under conditions with permit the reaction to proceed, characterised by the selection of hydrogen fluoride as the fluorinating agent and effecting vaporisation of the chlorocarbon by co-vaporising a mixture of the chlorocarbon compound with hydrogen fluoride whereby the boiling temperature of the
25 chlorocarbon compound/HF mixture is such that vaporisation thereof is accompanied by substantially less degradation of the chlorocarbon compound.

14. A process as claimed in Claim 12 or 13 in which chlorocarbon compound is a chloroethene or a chloroethane.

30 15. Apparatus for effecting vaporisation of a liquid organic compound at elevated pressures at which the organic compound is prone to degrade if vaporised at its boiling temperature at such elevated pressure, said apparatus comprising:
35 a vessel to which the organic compound and a second compound are supplied, the second compound being so selected that it produces with said organic compound a mixture having a boiling point substantially less than the boiling point of the organic compound;

means for intimately mixing the organic compound and said second compound;

means for heating the mixture within the vessel to effect co-vaporisation of the compounds; and

5 means for feeding the vaporised compounds to a process for utilising the resulting vaporised compounds.

16. Apparatus as claimed in Claim 15 including means for processing boiling vapour/liquid generated in said vessel to produce a liquid phase and a vapour phase, and means for recycling the liquid phase to
10 the vessel, the vapour phase being fed to said process for utilising the vaporised compounds.

17. Apparatus as claimed in Claim 16 in which the recycled liquid is mixed with a fresh mixture of said organic compound and said second compound prior to re-introduction into the vessel.

15 18. A process as claimed in Claim 1 in which the chemical reaction involves reaction between the first organic compound and a hot gaseous stream containing the second compound, the first organic compound when in the liquid phase being prone to degrade if allowed to reside in contact with a hot surface heated by the hot gaseous
20 stream, said process further comprising:

injecting said first organic compound as a liquid phase stream and said second compound as a gas phase stream into a conduit through which the hot gaseous stream flows so that the first organic compound is atomised at least in part by interaction
25 between the streams, the liquid droplets so formed being vaporised by contact with the hot gaseous stream.

19. A process as claimed in Claim 1 in which the chemical reaction involves reaction between the first organic compound and a hot gaseous stream containing the second compound, the first organic
30 compound when in the liquid phase being prone to degrade if allowed to reside in contact with a hot surface heated by the hot gaseous stream, said process further comprising:

injecting said first organic compound as a liquid phase stream into a conduit through which the hot gaseous stream flows, the
35 first organic compound being atomised at least in part by interaction with the hot gaseous stream and the droplets so

formed being vaporised by contact with the hot gaseous stream;
and

injecting said second compound as a gas phase stream into the
conduit downstream of the location of injection of the first
5 compound to compensate for the pressure drop in the wake of the
injected stream of said first compound and thereby prevent
deposition of said liquid droplets on the conduit wall
immediately downstream of the location of injection of the first
compound.

10 20. A process for introducing a first organic compound into a
conduit through which a hot gaseous stream flows under elevated
pressure conditions at variable flow rates, the compound being one
which is prone to degrade if allowed to reside in contact with the
hot wall or walls of the conduit, said process comprising:

15 injecting the first organic compound as a liquid phase into the
conduit for interaction with the hot gaseous stream whereby,
under higher flow rate conditions, the injected stream is
atomised to form liquid droplets which are transported by the
hot gaseous stream and undergo vaporisation; and
20 at least under relatively lower flow rate conditions in which
the hot gaseous stream is less effective to atomise the injected
stream, maintaining effective atomisation by injecting a second
compound as a gaseous phase stream into the conduit in such a
way that the first organic compound is atomised at least in part
25 by interaction between the injected streams.

21. A process as claimed in Claim 20 in which the second compound is
also injected into the conduit while said hot gaseous stream is
passed through the conduit under said higher flow rate conditions.

30 22. A process as claimed in any one of Claims 18 to 21 in which the
second compound constitutes a primary reactant for chemical reaction
with the first compound.

23. A chemical process involving contact between a hot gaseous
stream and an organic compound which, when in the liquid phase, is
prone to degrade if allowed to reside in contact with a hot surface
35 at or above a predetermined temperature, said process comprising:
atomising the organic compound by injection thereof into a
conduit through which the hot gaseous stream flows, the conduit

5 wall or walls being heated at least in part by the hot gaseous stream to at least said predetermined temperature; vaporising the liquid droplets so formed by contact with the hot gaseous stream as the liquid droplets are transported by the hot gaseous stream downstream of the location of injection; and
10 introducing a gas phase component into the conduit at a location downstream of the location of injection of the organic compound so as to form a boundary layer at the conduit wall or walls for reducing or preventing deposition of the liquid droplets on the conduit wall or walls.

24. A process as claimed in Claim 23 in which said gas phase component is constituted by part of the hot gaseous stream diverted from the main flow so as to by-pass the injected compound, the diverted part being re-introduced into the conduit downstream of the
15 injection location to form said boundary layer.

25. A process as claimed in any one of Claims 18 to 24 in which the liquid organic compound injected comprises a halocarbon.

26. A process as claimed in any one of Claims 18 to 25 in which the liquid phase stream is injected under pressure into the hot gaseous stream at a location where the pressure of the hot gaseous stream is
20 locally depressed.

27. A process as claimed in Claim 26 in which the hot gaseous stream is passed through a Venturi arrangement and in which the liquid phase stream is injected into the hot gaseous stream in the vicinity of the
25 Venturi throat.

28. A liquid injection device for the introduction of liquid phase organic compounds into a process gas stream, comprising:
a conduit section for coupling into, or forming part of, a conduit for the process gas stream;
30 a Venturi arrangement housed within the conduit section and including a throat section and a diffuser section downstream of the throat section;
a plurality of nozzles for injecting the liquid phase compound into the Venturi arrangement at, or in close proximity to, the throat
35 section whereby the liquid is atomised to produce droplets which are vaporised by the process gas stream; and

means for introducing a gaseous component into the Venturi arrangement at a location downstream of the nozzles in such a way as to create a moving layer of gas over the surfaces of the Venturi arrangement whereby unvaporised liquid droplets migrating towards such surfaces are prevented from residing in contact therewith.

29. A device as claimed in Claim 28 comprising means for partitioning the process gas flow into a first part which passes through the Venturi arrangement and a second part which by-passes at least part of the Venturi arrangement and is introduced into the Venturi arrangement at said location downstream of the nozzles whereby said second part constitutes said gaseous component used to create said moving layer of gas.

30. A liquid injection device for the introduction of liquid phase organic compounds into a process gas stream, comprising:

a conduit section for coupling into, or forming part of, a conduit for the process gas stream;

a Venturi arrangement housed within the conduit section and including a throat section and a diffuser section downstream of the throat section;

a plurality of nozzles for injecting the liquid phase component into the Venturi arrangement at, or in close proximity to, the throat section; and

means for introducing an auxiliary gas into the Venturi arrangement at the location of injection of the liquid from the nozzles in such a way that the liquid is subjected by the auxiliary gas to shear forces of sufficient magnitude to atomise the liquid.

31. A device as claimed in Claim 30 in which said means for introducing the auxiliary gas comprises a plurality of passageways each associated with a respective nozzle and opening into said conduit, the nozzles being arranged so as to extend with clearance through the passageways so that the liquid phase component and the auxiliary gas are injected into the conduit in co-current fashion.

32. A device as claimed in Claim 31 in which the inner extremity of each nozzle is located radially outwardly of the inner peripheral wall of the conduit.

33. A liquid injection device for the introduction of liquid phase organic compounds into a process gas stream, comprising:

a conduit section for coupling into, or forming part of, a conduit for the process gas stream;

a Venturi arrangement housed within the conduit section and including a throat section and a diffuser section downstream of the throat section;

a plurality of nozzles for injecting the liquid phase component into the Venturi arrangement at, or in close proximity to, the throat section; and

means for introducing an auxiliary gas into the Venturi arrangement at a location immediately downstream of the location of liquid injection, the auxiliary gas being injected in the wake of the liquid injected from the nozzles so as to nullify the localised pressure drop created by the liquid jets.